



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

May 13, 2011

Mr. Paul A. Harden  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Beaver Valley Power Station  
P.O. Box 4, Route 168  
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION – NRC TEMPORARY INSTRUCTION  
2515/183 INSPECTION REPORT 05000334/2011008 AND 05000412/2011008

Dear Mr. Harden:

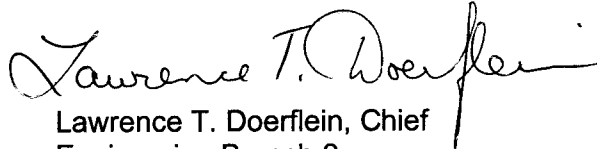
On April 29, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Beaver Valley Power Station Units 1 and 2, using Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event." The enclosed inspection report documents the inspection results which were discussed on April 29, 2011, with you and other members of your staff.

The objective of this inspection was to promptly assess the capabilities of Beaver Valley Power Station to respond to extraordinary consequences similar to those that have recently occurred at the Japanese Fukushima Daiichi Nuclear Station. The results from this inspection, along with the results from this inspection performed at other operating commercial nuclear plants in the United States will be used to evaluate the U.S. nuclear industry's readiness to safely respond to similar events. These results will also help the NRC to determine if additional regulatory actions are warranted.

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report. You are not required to respond to this letter.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agency Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

  
Lawrence T. Doerflein, Chief  
Engineering Branch 2  
Division of Reactor Safety

Docket Nos.: 50-334, 50-412  
License Nos.: DPR-66, NPF-73

Enclosure: Inspection Report Nos. 05000334/2011008 and 05000412/2011008

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P. Harden

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Sincerely,

/RA/

Lawrence T. Doerflein, Chief  
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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.: 50-334, 50-412

License No.: DPR-66, NPF-73

Report Nos.: 05000334/2011008 and 05000412/2011008

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Post Office Box 4  
Shippingport, PA 15077

Dates: March 31, 2011 through April 29, 2011

Inspectors: D. Werkheiser, Senior Resident Inspector  
E. Bonney, Resident Inspector  
T. Ziev, Reactor Inspector

Approved by: Lawrence T. Doerflein, Chief  
Engineering Branch 2  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

IR 05000334/2011008 and 05000412/2011008; 03/31/2011 – 04/29/2011; Beaver Valley Power Station, Units 1 and 2; Temporary Instruction 2515/183 - Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event.

This report covers an announced Temporary Instruction (TI) inspection. The inspection was conducted by two resident inspectors and a region based inspector. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

## **INSPECTION SCOPE**

The intent of the TI is to provide a broad overview of the industry's preparedness for events that may exceed the current design basis for a plant. The focus of the TI was on (1) assessing the licensee's capability to mitigate consequences from large fires or explosions on site, (2) assessing the licensee's capability to mitigate station blackout (SBO) conditions, (3) assessing the licensee's capability to mitigate internal and external flooding events accounted for by the station's design, and (4) assessing the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. If necessary, a more specific followup inspection will be performed at a later date.

## **INSPECTION RESULTS**

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report.

03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events, typically bounded by security threats, committed to as part of NRC Security Order Section B.5.b issued February 25, 2002, and severe accident management guidelines and as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh). Use Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," Section 02.03 and 03.03 as a guideline. If IP 71111.05T was recently performed at the facility the inspector should review the inspection results and findings to identify any other potential areas of inspection. Particular emphasis should be placed on strategies related to the spent fuel pool. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe what the licensee did to test or inspect equipment.
a. Verify through test or inspection that equipment is available and functional. Active equipment shall be tested and passive equipment shall be walked down and inspected. It is not expected that permanently installed equipment that is tested under an existing regulatory testing program be retested.	<p>Licensee actions included the identification of equipment (active and passive) utilized for implementation of B.5.b actions and any equipment used in Severe Accident Management Guidelines (SAMGs). The scope of the equipment was defined as that equipment specifically designated for B.5.b or SAMG mitigation (i.e., special hoses, fittings, diesel fire pumps, etc.). Permanent plant equipment (i.e., in situ equipment) was not considered in the scope, since it is normally in service, subjected to planned maintenance, and/or checked on operator rounds. The licensee then identified surveillances/tests and performance frequencies for the identified equipment, and reviewed the results of recent tests. Active equipment within the scope defined above that did not have recent test results were verified to have tests planned. Passive equipment within the scope was walked down and inspected. Specific condition reports (CRs) are noted in the supplemental information section.</p>
	<p>Describe inspector actions taken to confirm equipment readiness (e.g., observed a test, reviewed test results, discussed actions, reviewed records, etc.).</p>

<p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities. In addition, the inspectors independently walked down and inspected all major B.5.b contingency response equipment staged throughout the site. The results of the inspectors' independent walkdowns confirmed the results obtained by the licensee.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The licensee has no equipment designated for use in the SAMGs that is not considered in-situ plant equipment. Most equipment (active and passive) designated for B.5.b was verified by the licensee to be in applicable procedures. Deficiencies were noted by the licensee and were corrected. All passive equipment was walked down and verified to be in place and ready for use. Passive equipment which had surveillance and/or preventive maintenance tasks had those activities performed to verify readiness for use.</p> <p>All active equipment located at the site was verified in place by the licensee. The licensee verified all active equipment had been tested satisfactory, with one exception. The licensee identified an active component that did not have preventive maintenance or a surveillance procedure available. The component was verified to have previously operated successfully. The licensee identified this deficiency and entered it into the corrective action program (CAP) as CR 11-91290. The licensee identified a number of minor inventory deficiencies and took action to document and promptly correct.</p> <p>Based on the reviews conducted, the inspectors concluded that the required equipment is available and functional.</p>
<p>Licensee Action</p>	<p>Describe the licensee's actions to verify that procedures are in place and can be executed (e.g. walkdowns, demonstrations, tests, etc.).</p>



<p>b. Verify through walkdowns or demonstration that procedures to implement the strategies associated with B.5.b and 10 CFR 50.54(hh) are in place and are executable. Licensees may choose not to connect or operate permanently installed equipment during this verification.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>Licensee actions included the identification of those procedures utilized to mitigate the consequences of a B.5.b related event and severe accidents. The licensee then compiled verification documentation for procedure validations and identified any procedure not issued or validated and any with open change requests. Open change requests were reviewed for potential impacts on procedure functionality. Licensee personnel were then dispatched to walk down all applicable procedures to verify the ability of the procedures to be executed.</p>
	<p>Describe inspector actions and the sample strategies reviewed. Assess whether procedures were in place and could be used as intended.</p>
	<p>The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's capabilities by conducting a review of the licensee's documented walkdown activities. In addition, the inspectors selected several sections of a sample of the B.5.b procedures walked down by the licensee and walked those down to independently verify the licensee's conclusions.</p>
	<p>Discuss general results including corrective actions by licensee.</p>

	<p>The licensee reviewed SAMG strategies and did not identify any significant issues. Procedures used for B.5.b were reviewed by the licensee and walkdowns were performed by operators to ensure actions taken in the field in response to a B.5.b event could be performed. Open procedure change requests were reviewed by the licensee to verify there were no immediate procedure changes required. Some minor corrections and enhancements were identified by the licensee and entered into the CAP:</p> <p>CR 11-91338 was initiated to evaluate the creation of procedures and staging of equipment to ensure implementation of the strategies; and CR 11-91202 was initiated for several issues related to B.5.b procedure corrections.</p> <p>Based on the reviews conducted, the inspectors concluded that the procedures to implement the strategies associated with B.5.b and 10 CFR 50.54(hh) are in place and are executable.</p>
Licensee Action	Describe the licensee's actions and conclusions regarding training and qualifications of operators and support staff.
c. Verify the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).	<p>Licensee actions included the identification of training/qualification requirements for operators for the implementation of actions needed to mitigate a B.5.b related event, and for the implementation of actions needed for the SAMGs. The licensee documented that operator training requirements were current, and identified those operators with qualification requirements that were not current. In addition, the licensee identified the training/qualification requirements for applicable emergency response organization (ERO) command and support staff for the implementation of actions needed to mitigate a B.5.b related event, and for the implementation of actions needed for the SAMGs, and documented that ERO command and support staff training requirements were current. Where applicable, the licensee identified those ERO command and support staff with qualification requirements that were not current.</p>

	Describe inspector actions and the sample strategies reviewed to assess training and qualifications of operators and support staff.
	The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's training and qualification activities by conducting a review of training and qualification materials and records related to B.5.b and SAMG event response.
	Discuss general results including corrective actions by licensee.
	<p>The training requirements, qualifications, and associated records needed for operators for the implementation of SAMGs and B.5.b event response were reviewed by the licensee. Training was identified for shift managers, shift engineers, and unit supervisors, and the licensee verified that the training requirements were embedded within the position qualifications for the operators. The licensee confirmed that all shift operators verify their qualifications prior to assuming a shift position. The training requirements, qualifications, and associated records needed for ERO command and support staff for the implementation of actions needed to mitigate a B.5.b event or implement the SAMGs were also reviewed. All ERO command and support staff training requirements were verified as current by the licensee with two exceptions:</p> <ul style="list-style-type: none"> <li>• The Assistant to Emergency Director Position does not currently include training on the severe accident management guidelines. The Assistant to Emergency Director position is currently located in the Technical Support Center (TSC) and is a technical position.</li> <li>• Some personnel are not current due to medical restrictions or long term illnesses. Training is completed as personnel are physically able to return to their normal duties.</li> </ul> <p>The licensee documented this issue as CR 11-91296 to review the gap identified with the SAMG training for the Assistant to Emergency Director.</p>

	<p>The inspectors reviewed the licensee's assessment and corrective actions, and completed an independent assessment. Based on these actions, the inspectors concluded that the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).</p>
Licensee Action	<p>Describe the licensee's actions and conclusions regarding applicable agreements and contracts are in place.</p>
<p>d. Verify that any applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of these events.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>Licensee actions included the identification of all applicable contracts and agreements committed to be in place for the mitigation of a B.5.b related event. The licensee verified that the contracts and agreements were current, and documented whether or not the contracts/agreements were capable of meeting the mitigation strategy.</p>
	<p>For a sample of mitigating strategies involving contracts or agreements with offsite entities, describe inspector actions to confirm agreements and contracts are in place and current (e.g., confirm that offsite fire assistance agreement is in place and current).</p>
	<p>The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's capabilities by conducting an independent review of the licensee's emergency response letters of agreement with the Beaver County Emergency Management Agency. The inspectors' review of the agreement verified that it was current, and assessed whether or not it was adequate for meeting the licensee's mitigation strategy. The inspectors also verified that letters of agreement were in place with the surrounding three states and local counties.</p>
	<p>Discuss general results including corrective actions by licensee.</p>

	The licensee determined that agreements and contacts were in place and current. No deficiencies were noted. The inspectors concluded that applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of these events.
Licensee Action	Document the corrective action report number and briefly summarize problems noted by the licensee that have significant potential to prevent the success of any existing mitigating strategy.
e. Review any open corrective action documents to assess problems with mitigating strategy implementation identified by the licensee. Assess the impact of the problem on the mitigating capability and the remaining capability that is not impacted.	FENOC determined no significant issues were identified. However, the licensee identified that preventive maintenance (PM) activities and a surveillance procedure were currently not available for an active component utilized in a B.5.b mitigation strategy. The component had previously operated successfully and the issue has been entered in the CAP under CR 11-91290. Other minor issues were identified and documented in the CRs listed in the Supplemental Information. The inspectors reviewed the CRs and determined there was not a significant impact to any existing mitigating strategy.

03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63, "Loss of All Alternating Current Power," and station design, is functional and valid. Refer to TI 2515/120, "Inspection of Implementation of Station Blackout Rule Multi-Plant Action Item A-22" as a guideline. It is not intended that TI 2515/120 be completely reinspected. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe the licensee's actions to verify the adequacy of equipment needed to mitigate an SBO event.
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<p>a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>Licensee actions included the identification of equipment utilized/required for mitigation of a SBO. The licensee then conducted walkdowns to ensure this equipment was adequate and properly staged. Additionally, the licensee also conducted a review of open CAP items for potential SBO equipment impact.</p>
	<p>Describe inspector actions to verify equipment is available and useable.</p>
	<p>The inspectors assessed the licensee's capability to mitigate SBO conditions by conducting a review of the licensee's walkdown activities. In addition, the inspectors selected a sample of equipment utilized/required for mitigation of a SBO and conducted independent walkdowns of that equipment to verify that the equipment was properly aligned and staged. The sample of equipment selected by the inspectors included, but was not limited to, the SBO cross-tie and Emergency Response Facility (ERF) diesel generator and related infrastructure.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The above reviews verified that SBO equipment was ready to respond to a SBO condition. However, the inspectors noted that challenges exist due to current UPS failures that support the ERF diesel generator, requiring extra procedure actions to power ERF buses. The licensee has entered this issue into the CAP and plans to repair the equipment deficiency</p> <p>The licensee initiated two conditions reports for issues identified during the walkdowns: CR 11-91206, Manual charging spring tool for 4kV breakers could not be found, and no ladder staged in intake "C" cubicle for accessing required valves; and CR 11-91347, Components to open HYV-1FW-100A(B)(C) insufficiently labeled to ensure proper connections. The inspectors determined these issues would not have prevented successful implementation of SBO procedures.</p>

Licensee Action	Describe the licensee's actions to verify the capability to mitigate an SBO event.
b. Demonstrate through walkdowns that procedures for response to an SBO are executable.	<p>Licensee actions included the identification of procedures required for response to a SBO, along with verification that the identified procedures were current and that no critical revision requests were in place. The licensee then verified that the mitigating procedures had been properly validated and performed walkdowns of selected procedures. Additionally, the licensee conducted a review of open CAP items for potential impact to SBO procedures.</p>
	<p>Describe inspector actions to assess whether procedures were in place and could be used as intended.</p>
	<p>The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities. In addition, the inspectors selected several sections of a sample of the procedures walked down by the licensee and walked those down to independently verify the licensee's conclusions.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The licensee procedures utilized to respond to an SBO are within the scope of the site emergency operating procedures (EOPs). Actions to start the SBO diesel generator (a functional EDG on the non-affected unit) and supply power to the affected-unit vital buses are performed from the control room (as augmented with field actions) with permanently installed plant equipment. For the purposes of this requirement, the licensee credited their original validation of the specific EOP by a crew of licensed operators on the simulator prior to the implementation of the current revision. No significant current issues were identified by the licensee, however three CRs were written to document minor issues and/or areas for improvement (CRs 11-91263, 11-91353, and 11-91356).</p>

	<p>Although the station meets the current design and licensing bases for station blackout, the inspectors concluded that coping with a dual unit SBO (a beyond design basis event) could present significant challenges. For example: the SBO cross-tie equipment is located in non-seismically qualified areas (normal switchgear) of each unit; and Unit 1 requires AC power to the MOVs to isolate the safety injection accumulators during RCS depressurization.</p> <p>The licensee documented the general issue of a dual unit SBO under CR 11-93717.</p>
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03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design. Refer to IP 71111.01, "Adverse Weather Protection," Section 02.04, "Evaluate Readiness to Cope with External Flooding" as a guideline. The inspection should include, but not be limited to, an assessment of any licensee actions to verify through walkdowns and inspections that all required materials and equipment are adequate and properly staged. These walkdowns and inspections shall include verification that accessible doors, barriers, and penetration seals are functional.

Licensee Action	Describe the licensee's actions to verify the capability to mitigate existing design basis flooding events.
a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.	<p>Licensee actions included the identification of equipment and penetration seals utilized/required for mitigation of internal and external flooding. The licensee then conducted walkdowns of this equipment to ensure it was adequate and properly staged. Doors, barriers, and penetration seals that were utilized for mitigation of flooding were identified, and checked to see if they were routinely inspected to ensure functionality. Where routine inspections were not performed or could not be relied upon to ensure functionality, the licensee performed walkdowns and inspections to ensure that the components were functional.</p> <p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p>



	<p>The inspectors assessed the licensee's capabilities to mitigate flooding by conducting a review of the licensee's walkdown activities. In addition, the inspectors conducted independent walkdowns of selected flood mitigation equipment to contribute to the overall assessment of the licensee's flood mitigating capabilities. Licensee flood mitigation procedures were reviewed to verify usability. The inspectors' conclusions aligned with the results obtained by the licensee.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The inspectors concluded that all required materials are adequate and properly staged, tested, and maintained to respond to an internal or external flood within the plant's design basis. While no operability or significant concerns were identified, the licensee identified that two portable pumps credited in the flood analysis did not have periodic testing performed, and that flood barriers and penetrations that were not part of the fire protection program were not routinely inspected. These and several other minor deficiencies were entered into the CAP and the associated condition reports are listed in the Attachment to this report. The inspectors reviewed these condition reports and determined the licensee's initial responses, including their assessment and prioritization, were appropriate.</p>

03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. Assess the licensee's development of any new mitigating strategies for identified vulnerabilities (e.g., entered it in to the corrective action program and any immediate actions taken). As a minimum, the licensee should have performed walkdowns and inspections of important equipment (permanent and temporary) such as storage tanks, plant water intake structures, and fire and flood response equipment; and developed mitigating strategies to cope with the loss of that important function. Use IP 71111.21, "Component Design Basis Inspection," Appendix 3, "Component Walkdown Considerations," as a guideline to assess the thoroughness of the licensee's walkdowns and inspections.

Licensee Action	Describe the licensee's actions to assess the potential impact of seismic events on the availability of equipment used in fire and flooding mitigation strategies.
a. Verify through walkdowns that all required materials are adequate and properly staged, tested, and maintained.	Licensee actions included the identification of equipment utilized/required for mitigation of fire and flood events. An engineering inspection plan was established by the licensee to govern the conduct of walkdowns and inspections of the equipment, both permanent and temporary. Licensee engineering personnel determined if the equipment was seismically qualified, or assessed whether it would be possible to evaluate the equipment as being seismically rugged. Seismic vulnerabilities, including storage locations, were identified, along with mitigating strategies for equipment that was not seismically qualified.
	Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.

	<p>The inspectors conducted multiple independent walkdowns of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during a seismic event. This equipment included, but was not limited to:</p> <ul style="list-style-type: none"> <li>• all major B.5.b contingency response equipment staged throughout the site;</li> <li>• the installed diesel and electric fire pumps, their controls, and other fire equipment;</li> <li>• the Emergency Response Facility diesel generator; and</li> <li>• watertight doors and floor plugs at the plant's main and alternate intake structures.</li> </ul> <p>Licensee flood and fire mitigation procedures were reviewed to verify usability. The results of the inspectors' reviews aligned with the licensee's conclusions that there were a number of seismic vulnerabilities that may need to be addressed, as described below. The inspectors concluded that the licensee meets the current design and licensing bases for B.5.b, fire and flood protection.</p> <p>Discuss general results including corrective actions by licensee. Briefly summarize any new mitigating strategies identified by the licensee as a result of their reviews.</p>
	<p>"Seismically qualified" is defined as the SSCs that have been formally qualified to function during and after a design basis earthquake, as applicable. The licensee's reviews for this issue determined that non-safety related SSCs, in general, were not considered to be either seismically qualified or seismically rugged. The majority of room flood mitigation sump pumps and flooding detectors were not designed as seismically qualified, and have not been evaluated as being seismically rugged. Similarly, the vast majority of the fire protection system / piping, including both installed fire pumps, were not designed as seismically qualified and cannot be considered seismically rugged. Firefighting equipment staged to respond to B.5.b events was not stowed in seismically qualified buildings and locations, as a seismic event and B.5.b event were not assumed to occur coincidentally.</p> <p>The licensee's reviews identified instances where response capability could be enhanced. These included improving procedural guidance, reviewing the locations of portable equipment, and reviewing the need for supplemental portable equipment to compensate for the possible loss of the fire water storage tank, the fire pumps, and much of the fire suppression system piping.</p>

	<p>Further, reviews by the licensee identified that, in the event of a postulated earthquake, equipment may not function properly due to loss of vital power or being subjected to physical displacement. The existing mitigation strategy, to conduct station surveys per emergency plan off normal occurrence procedure RA-EP-02820, "Earthquake," was considered presently sufficient by the licensee. Further mitigation strategies, the licensee determined, will entail following industry recommendations from other plants that have identified similar beyond-design-bases vulnerabilities. The licensee entered the issues identified into their CAP CRs 11-92571, and 11-93717.</p>
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## Meetings

### 4OA6 Exit Meeting

The inspectors presented the inspection results to Mr. Paul Harden and other members of licensee management at the conclusion of the inspection on April 29, 2011. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

P. Harden, Site Vice President, Beaver Valley Power Station  
R. Lieb, Director of Site Operations, Beaver Valley Power Station  
G. Cramer, Manager, Emergency Response  
C. Hynes, Manager, Site Training  
C. Mancuso, Manager, Design Engineering  
C. McFeaters, Manager, Operations  
J. Miller, Site Fire Marshal  
D. Price, Supervisor, Design Engineering  
M. Ressler, Supervisor, Engineering Analysis  
B. Rudolph, Superintendent, Operations Training  
K. Woessener, Staff Nuclear Engineer, Beaver Valley IER 11-1 Response Team Lead

#### Nuclear Regulatory Commission

C. Cahill, Senior Reactor Analyst  
W. Cook, Senior Reactor Analyst

#### Other Personnel

L. Ryan, Inspector, Pennsylvania Bureau of Radiation Protection

### **LIST OF DOCUMENTS REVIEWED**

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

#### **03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events**

##### Procedures:

1/2OM-53C.4A.100.1, B.5.b and Threat-Related Mitigation Procedures, Rev. 2  
1/2OM-53C.4A.100.2, B.5.b and Threat-Related Mitigation Procedures, Rev. 3  
1/2OM-53C.4A.100.3, B.5.b and Threat-Related Mitigation Procedures, Rev. 2  
1/2OM-53C.4A.100.4, B.5.b and Threat-Related Mitigation Procedures, Rev. 4

Attachment

1/2OM-53C.4A.100.5, B.5.b and Threat-Related Mitigation Procedures, Rev. 0  
1/2OM-53C.4A.100.6, B.5.b and Threat-Related Mitigation Procedures, Rev. 5  
1/2OST-33.33, Fire Protection Equipment Inventory, Rev. 4  
2OM-53A.1.A-1.8, Makeup to PPDWST [2FWE\*TK210], Rev. 5  
2OM-53A.1.A-1.11, Manual Handpump Operation of Hydraulically Actuated Valves, Rev. 5

Condition Reports:

11-91202, 100 Series AOPs Missing Steps  
11-91206, Missing Tools/Ladders to Support SBO Response  
11-91260, 100 Series AOPs Missing Inventory  
11-91261, 1/2OST-33.33 Attachment 6 Deficiencies  
11-91290, Active Component Without PM  
11-91294, Missing Flashlights  
11-91296, Assistant to Emergency Director Training on SAMGs  
11-91319, Operations Training for Security Threat  
11-91325, Phone-Control Room Satellite Coverage  
11-91338, Equipment and Procedures not Designated for B.5.b  
11-91345, Equipment Availability Issues  
11-93575, High-Pressure Godwin Pump Duplex Strainer Operation Issues

**03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions**

Procedures:

1OM-53A.1.ECA-0.0(ISS1C), Loss of all Emergency 4kV AC Power, Rev. 8  
1OM-53A.1.ECA-0.1(ISS1C), Loss of all AC Power Recovery Without SI Required, Rev. 5  
1OM-53A.1.ECA-0.2(ISS1C), Loss of all AC Power Recovery With SI Required, Rev. 5  
1OM-53A.1.2-D, AC Power Restoration from Offsite, Rev. 2  
1OM-53A.1.2-E(ISS1C), Local Action to Restore AC Power, Rev. 3  
1OM-53A.1.2-F(ISS1C), Diesel Generator Auto Loading and Auxiliary Equipment, Rev. 2  
1OM-53A.1.2-G(ISS1C), Natural Circulation Verification, Rev. 1  
1OM-53A.1.2-H(ISS1C), Makeup to PPDWST [1WT-TK-10], Rev. 2  
1OM-53A.1.2-I, Response to Loss of AFW Pump Suction Flow, Rev. 1  
1OM-53A.1.2-J(ISS1C), Feeding Steam Generators from Condensate System, Rev. 1  
1OM-53A.1.2-K(ISS1C), Dedicated AFW Pump [1FW-P-4] Startup, Rev. 1  
1OM-53A.1.2-O-AE(ISS1C), Starting River Water Pump on Bus 1AE During SBO, Rev. 0  
1OM-53A.1.2-O-DF(ISS1C), Starting River Water Pump on Bus 1DF During SBO, Rev. 0  
1OM-53A.1.2-P-AE(ISS1C), Starting Charging/HHSI Pump on Bus 1AE During SBO, Rev. 0  
1OM-53A.1.2-P-DF(ISS1C), Starting Charging/HHSI Pump on Bus 1DF During SBO, Rev. 0  
1OM-53A.1.2-Q-AE(ISS1C), Restoring Equipment from Bus 1AE after SBO at BV-1, Rev. 0  
1OM-53A.1.2-Q-DF(ISS1C), Restoring Equipment from Bus 1DF after SBO at BV-1, Rev. 0  
1OM-53A.1.2-S(ISS1C), Monitoring AFW Pump Performance During Loss of Station Instrument Air, Rev. 3  
1OM-53A.1.2-T, Opening One SG Main FW Containment Isolation Valve Without Power, Rev. 0  
1OM-53A.1.2-U, Local Operation of SG Atmospheric Steam Dump Valves, Rev. 1  
1OM-53A.1.A-1.14(ISS1C), BV-1 Actions to Establish SBO Cross-Tie to BV-2, Rev. 2  
1OM-53A.1.A-1.17(ISS1C), Restoring BV-1 Equipment after SBO at BV-2, Rev. 0

### A-3

1OM-53A.1.2-M-AE, Actions to Establish BV-2 Cross-tie to Bus 1AE During SBO, Rev. 3  
2OM-53A.1.ECA-0.0(ISS1C), Loss of all AC Power, Rev. 10  
2OM-53A.1.ECA-0.1(ISS1C), Loss of all AC Power Recovery Without SI Required, Rev. 7  
2OM-53A.1.ECA-0.2(ISS1C), Loss of all AC Power Recovery With SI Required, Rev. 5  
2OM-53A.1.2-N(ISS1C), BV-2 Actions to Establish SBO Cross-Tie to BV-1, Rev. 1  
2OM-53A.1.2-N(ISS1C), BV-2 Actions to Establish SBO Cross-Tie to BV-1, Rev. 1  
2OM-53A.1.2-R(ISS1C), Restoring BV-2 Equipment after SBO at BV-1, Rev. 0  
2OM-53A.1.A-1.10(ISS1C), Feeding Steam Generators from Condensate System, Rev. 0  
2OM-53A.1.A-1.11, Manual Handpump Operation of Hydraulically Actuated Valves, Rev. 5  
2OM-53A.1.A-1.12, Local Actions to Restore AFW Flow, Rev. 4  
2OM-53A.1.A-1.15AE, Starting Charging/HHSI Pump on BUS 2AE During SBO, Rev. 0  
2OM-53A.1.A-1.15DF, Starting Charging/HHSI Pump on BUS 2DF During SBO, Rev. 0  
2OM-53A.1.A-1.16AE, Restoring BV-2 Equip from Bus 2AE after SBO at BV-2, Rev. 1  
2OM-53A.1.A-1.16DF, Restoring BV-2 Equip from Bus 2DF after SBO at BV-2, Rev. 1  
2OM-53A.1.A-1.18(ISS1C), ERFS Diesel Generator Startup, Rev. 0  
2OM-53A.1.A-1.4, AC Power Restoration from Offsite, Rev. 1  
2OM-53A.1.A-1.5(ISS1C), Local Action to Restore AC Power, Rev. 5  
2OM-53A.1.A-1.6, Generator Auto Loading and Auxiliary Equipment, Rev. 3  
2OM-53A.1.A-1.8, Makeup to PPDWST [2FWE\*TK210], Rev. 5  
2DD.ECA-0.2, Loss of All AC Power Recovery with SI Required Deviation Document, Rev. 1C-5  
2OM-53A.1.A-1.15AE, Starting Charging/HHSI Pump on Bus 2AE During an SBO, Rev. 1C-0  
2OM-53A.1.ECA-0.0, Loss of All AC Power, Rev. 1C-10  
2OM-53A.a.A-1.13AE, Actions to Establish BV-1 Cross-Tie to Bus 2AE During SBO, Rev. 2  
2OM-53A.a.A-1.22, Steam Generator Makeup During SBO Using [3FP-P-7], Godwin High-Pressure Pump, Rev. 0

#### Condition Reports:

11-91263, SBO Procedure Corrections  
11-91347, EOP Attachment 2-T Issues Identified During Walkdown  
11-91353, U2 Lighting Deficiency at ASD Panel  
11-91356, Pre-staged SBO Equipment Improvements  
11-91549, Testing Issues for 1RW-60 and 2SWS-60  
11-91671, Equipment Needed for AOP 75.2 Not Staged  
11-92242, ERFS – UPS#2 Failure  
11-93717\*, Inspector Questions BVPS Dual Unit SBO Assumptions

\* Condition Report written as a result of inspection.

#### Calculations/Evaluations:

10080-E-048, SBO Loading Analysis, Rev. 12-A8



**03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design**

Procedures:

1/2OM-53C.4A.75.2, Acts of Nature - Flood, Rev. 28  
1/2OM-53C.4A.75.4, Acts Of Nature - Dam Failure, Rev. 7  
1BVT1.33.07, Flood Seals Visual Inspection, Rev. 4  
1OM-30.4.AAA, CC WTR HT EXCH River WTR PP DISH Line 'A' Press Low, Rev. I3-R2  
1OM-30.4.AAB, CC WTR HT EXCH River WTR PP DISH Line 'B' Press Low, Rev. I3-R2  
1OM-30.4.AAC, Intake Struct Water Pump Discharge Line 'A' Press Low, Rev. 3  
1OM-30.4.AAD, Intake Struct River Water Pump Discharge Line 'B' Pressure Low, Rev. I3-R2  
1OM-36.4.AEY, Diesel Generator Room No. 1 or No. 2 Sump Level High, Rev. 0  
1OM-41D.4.AAB, Service Building Water Accumulation, Rev. 5  
1OM-9.4.AAI, Aux Bldg Well Sump Level High, Rev. 1  
1OM-9.4.AAJ, Aux Building North Sump Level High, Rev. 2  
1OM-9.4.AAK, Tunnel Sump Level High, Rev. 3  
1OM-9.4.AAM, Safeguards Area Sump Level High, Rev. 0  
1OM-9.4.AAN, Fuel Building Sump Level High, Rev. 2  
1OM-9.4.AAO, Aux Building South Sump Level High, Rev. 1  
1OM-9.4.AAQ, Charging Pump 1A Cubicle Sump Level High, Rev. 0  
1OM-9.4.AAR, Charging Pump 1B Cubicle Sump Level High, Rev. 0  
1OM-9.4.AAS, Charging Pump 1C Cubicle Sump Level High, Rev. 1  
2BVT1.33.7, Flood Seals Visual Inspection, Rev. 3  
2OM-41D.4.AAA, Diesel Generator Building Sump Level High, Rev. 3  
2OM-41D.4.AAF, Elect Cable Tunnel/Contiguous Area Sump Level High, Rev. 6  
2OM-9.4.AAE, Fuel Building Sump Level High, Rev. 2  
2OM-9.4.AAH, Rod Control Area Pipe Tunnel Sump Level High, Rev. 3  
2OM-9.4.AAI, Auxiliary Building Sump Level High, Rev. 2  
2OM-9.4.AAJ, Safeguards Area Sump Level High, Rev. 1  
2OST-33.35A, Fire Rated Penetration Seals Visual Inspection Outage Required, Rev. 0

Condition Reports:

11-91736, No Procedure for Intake Structures Pump Cubicle Internal Flooding Response  
11-91840, Flood Seal Inspection BVTs Require Revision  
11-91843, Unit 1 Internal Conduit Flood Seals Inaccessible for Inspection  
11-91846, Unit 2 Flood Seals Inaccessible for Inspection  
11-91853, Periodic Flood Seal Inspections by BVTs Not Performed Since 2005  
11-91860, Review of Open Orders for Flood Seal Impact  
11-91887, Flood Equipment Identified Without Inventory/OST  
11-91890, Flood Door Not Electronically Supervised and Not Periodically Verified  
11-91894, Credited Door Not Supervised and Not Periodically Verified  
11-91899, Undesignated Flood Barriers in BVPS -1 Main Steam Valve Area  
11-91900, BVPS 1 & 2 Sump Level Switches Not in Calibration Program  
11-92062, Credited Floor Drains do Not Have a PM Task  
11-92065, Passive Flood Barriers are Not Specified in Admin Procedure

Calculations/Evaluations:

ES-M-036, Report of the Effects of a Piping System Break Outside Containment, Rev. 0  
Drawings:

8700-RA-19A, Intake Structure, Plan & Elevation, Rev. 8  
8700-RA-19B, Intake Structure, Wall Sections & Details, Rev. 9

Other:

BVPS-1 UFPARR, BVPS-1 Updated Fire Protection Appendix R Review, Rev. 30  
BVPS-1 UFSAR Section 2.7.3.2.5, Other Plant Areas and Equipment, Rev. 25  
BVPS-1 UFSAR Section 9.7.2, Vent and Drain System Description, Rev. 25  
BVPS-2 FPSSR, BVPS-2 Fire Protection Safe Shutdown Report, Rev. 36

**03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events**

Procedures:

1OM-30.4.AAA, CC WTR HT EXCH River WTR PP DISH Line 'A' Press Low, Rev. I3-R2  
1OM-30.4.AAC, Intake Struct Water Pump Discharge Line 'A' Press Low, Rev. 3  
1OM-53E.1.SAG-2, Depressurize the RCS, Rev. 3  
1OM-53A.1.E-0(ISS1C), Reactor Trip or Safety Injection, Rev. 11  
1OM-53A.1.E-1(ISS1C), Loss of Reactor or Secondary Coolant, Rev. 14  
1OM-53A.1.FR-C.1(ISS1C), Response to Inadequate Core Cooling, Rev. 8  
1OM-53A.1.FR-I.3(ISS1C), Response to Voids in Reactor Vessel, Rev. 6  
1OM-53A.1.FR-S.2(ISS1C), Response to Loss of Core Shutdown, Rev. 1  
1OM-53A.1.FR-Z.1(ISS1C), Response to High Containment Pressure, Rev. 2  
1OM-53A.1.FR-Z.2(ISS1C), Response to Containment Flooding, Rev. 2  
2OM-53E.1.SAG-2, Depressurize the RCS, Rev. 2  
2OM-53A.1.E-0(ISS1C), Reactor Trip or Safety Injection, Rev. 8  
2OM-53A.1.E-1(ISS1C), Loss of Reactor or Secondary Coolant, Rev. 12  
2OM-53A.1.FR-C.1(ISS1C), Response to Inadequate Core Cooling, Rev. 5  
2OM-53A.1.FR-I.3(ISS1C), Response to Voids in Reactor Vessel, Rev. 8  
2OM-53A.1.FR-S.2(ISS1C), Response to Loss of Core Shutdown, Rev. 1  
2OM-53A.1.FR-Z.1(ISS1C), Response to High Containment Pressure, Rev. 2  
2OM-53A.1.FR-Z.2(ISS1C), Response to Containment Flooding, Rev. 2  
2OM-53A.1.FR-Z.3(ISS1C), Response to High Containment Radiation Level, Rev. 2

Condition Reports

11-91720, Buried Fire Protection Piping Vulnerability  
11-91794, Potential For Inadvertent CO2 Discharge with Seismic Event  
11-91922, Storage for Beyond Design Basis Equipment Lacks Quality  
11-92160, Material Condition of Portable Diesel Fire Pumps  
11-92343, Fire Line Corrosion Identified During Inspection

11-92388, Fire Protection System Vulnerabilities During a Seismic Event  
11-92393, Unit 1 Fire Protection Systems Inaccessible for Inspection  
11-92394, Specific Fire Protection Deficiencies Identified During Walkdown  
11-92415, Vulnerabilities During a Flood Event Following an Earthquake  
11-92531, Aggregate Impact Evaluation BVPS OSS Fire Protection Equipment

Other:

Active and Passive Equipment Credited Inventory Spreadsheet, 3/23/11  
Basic Instruction Card for Godwin Low Pressure Driven Prime Pump  
BV-1 & BV-2 Updated Final Safety Analysis Reports, Rev. 23 & 6  
BV-1 Shift Operations Logs Regarding ERFS UPS Issues, 4/2/11  
Mutual Response Agreements, current as of 4/28/11

**LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
AFW	Auxiliary Feedwater
ARM	Area Radiation Monitors
CAM	Continuous Air Monitors
CAP	Corrective Action Program
CFR	Code of Federal Regulations
NRC	United States Nuclear Regulatory Commission
SBO	Station Blackout